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U.S. Application No.: 10/506,622

U.S. National Stage of:

International Application No.: PCT/EP03/02395

International Filing Date: 4 March 2003

For: MIXTURE COMPRISING SULPHONIC ACID CONTAINING VINYL,  
POLYMER ELECTROLYTE MEMBRANE COMPRISING  
POLYVINYLSULPHONIC ACID AND THE USE THEREOF IN FUEL CELLS

Date: Nov. 18, 2004

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TRANSMITTAL OF INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT

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Sir:

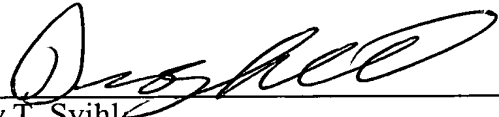
Enclosed for filing in the U.S. Receiving Office is a copy of the English translation of the International Preliminary Examination Report (5 pages).

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Respectfully submitted,

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Translation

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PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 2002/CVG005K	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/EP2003/002395	International filing date (day/month/year) 04 March 2003 (04.03.2003)	Priority date (day/month/year) 06 March 2002 (06.03.2002)
International Patent Classification (IPC) or national classification and IPC C08J 5/22, B01D 7/00, H01M 8/02		
Applicant PEMEAS GmbH		

<p>1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of <u>5</u> sheets, including this cover sheet.</p> <p><input checked="" type="checkbox"/> This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).</p> <p>These annexes consist of a total of <u>6</u> sheets.</p>	
<p>3. This report contains indications relating to the following items:</p> <p>I <input checked="" type="checkbox"/> Basis of the report</p> <p>II <input type="checkbox"/> Priority</p> <p>III <input type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p>IV <input type="checkbox"/> Lack of unity of invention</p> <p>V <input checked="" type="checkbox"/> Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p>VI <input type="checkbox"/> Certain documents cited</p> <p>VII <input type="checkbox"/> Certain defects in the international application</p> <p>VIII <input type="checkbox"/> Certain observations on the international application</p>	

Date of submission of the demand 09 September 2003 (09.09.2003)	Date of completion of this report 19 July 2004 (19.07.2004)
Name and mailing address of the IPEA/EP	Authorized officer
Facsimile No.	Telephone No.

# INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International Application No.

PCT/EP2003/002395

## I. Basis of the report

### 1. With regard to the elements of the international application:\*

- ☐ the international application as originally filed
- ☒ the description:  
 pages 1,2,4-45, as originally filed  
 pages \_\_\_\_\_, filed with the demand  
 pages 3, filed with the letter of 29 April 2004 (29.04.2004)
- ☒ the claims:  
 pages \_\_\_\_\_, as originally filed  
 pages \_\_\_\_\_, as amended (together with any statement under Article 19  
 pages \_\_\_\_\_, filed with the demand  
 pages 1-19, filed with the letter of 29 April 2004 (29.04.2004)
- ☐ the drawings:  
 pages \_\_\_\_\_, as originally filed  
 pages \_\_\_\_\_, filed with the demand  
 pages \_\_\_\_\_, filed with the letter of \_\_\_\_\_
- ☐ the sequence listing part of the description:  
 pages \_\_\_\_\_, as originally filed  
 pages \_\_\_\_\_, filed with the demand  
 pages \_\_\_\_\_, filed with the letter of \_\_\_\_\_

### 2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language \_\_\_\_\_ which is:

- ☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of the translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

### 3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

### 4. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages \_\_\_\_\_
- ☐ the claims, Nos. \_\_\_\_\_
- ☐ the drawings, sheets/fig \_\_\_\_\_

### 5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).\*\*

\* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rule 70.16 and 70.17).

\*\* Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No.

PCT/EP 03/02395

## V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

## 1. Statement

Novelty (N)	Claims	1-19	YES
	Claims		NO
Inventive step (IS)	Claims	1-19	YES
	Claims		NO
Industrial applicability (IA)	Claims	1-19	YES
	Claims		NO

## 2. Citations and explanations

## 1. Documents

D1: WO 99/10165 A (FORMATO RICHARD M; FOSTER MILLER INC (US); OSEAR PAUL (US); KOVAR) 4 March 1999, (1999-03-04)

## 2. Amendments

The amendments to the subject matter of the claims meet the requirements of PCT Article 19(2) and PCT Article 34(2)(b). The new independent claim 1 is a combination of the old claims 1 and 11.

## 3. Novelty and inventive step

D1 describes polymer membranes based on a mixture of polymers with vinyl-containing sulfonic acid (claims 1, 5, 7, 27) and the formation of a flat structure on a support (claim 34) as claimed in claims 1 and 4 of the present application.

D1 also describes high temperature-stable polymers (claims 5, 11 to 14), in particular also polyazoles and polysulfones as claimed in claims 2 and 3 of the present

application.

In addition, D1 describes the use of the aforementioned polymer membranes in fuel cells (claims 39-40).

The subject matter of the newly submitted set of claims is novel over D1 because D1 does not disclose a membrane with intrinsic conductivity (PCT Article 33(2)).

The subject matter of the newly submitted independent claim 1 differs from that of D1 in that the membrane according to the application has intrinsic conductivity.

The effect of intrinsic conductivity of this type is that a fuel cell containing a membrane of this type does not require any additional humidification in order to provide power. A membrane of this type therefore enables fuel cells in which there is no drop in power output when there is a lack of water to be provided.

The problem addressed by the present application is that of providing a fuel cell in which there is no drop in power output when there is a lack of water.

The membrane with intrinsic conductivity according to the invention is provided as the solution to the aforementioned problem.

A person skilled in the art could not foresee this solution from the prior art, since D1 does not suggest it.

The subject matter of independent claim 1 therefore appears to be inventive in relation to the prior art (PCT Article 33(3)).

Independent claims 13, 18 and 19 also appear to be novel and inventive in relation to the prior art.

Claim 13 discloses a mixture of a vinyl-containing sulfonic acid as defined in claim 4 and a polymer that dissolves to at least 1 wt.% in the vinyl-containing sulfonic acid.

Claim 18 claims a membrane/electrode unit that contains the membrane according to claims 1 to 12.

Claim 19 claims a fuel cell based on the membrane claimed in claims 1 to 12.

#### 4. Further observations

The subject matter of the present application is regarded as industrially applicable within the meaning of PCT Article 33(4).